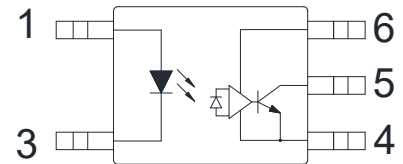


### ● Description

The KPC611 series consist of an LED optically coupled to an OPIC chip. It is a high-speed digital output type photo coupler designed specifically for low circuit current. And it is packaged in a 5pin mini-flat package.

### ● Schematic



- 1. Anode
- 3. Cathode
- 4. GND
- 5. Vo
- 6. Vcc

### ● Features

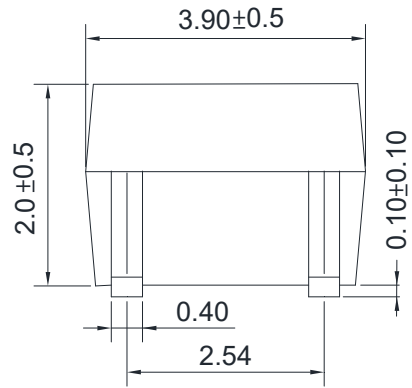
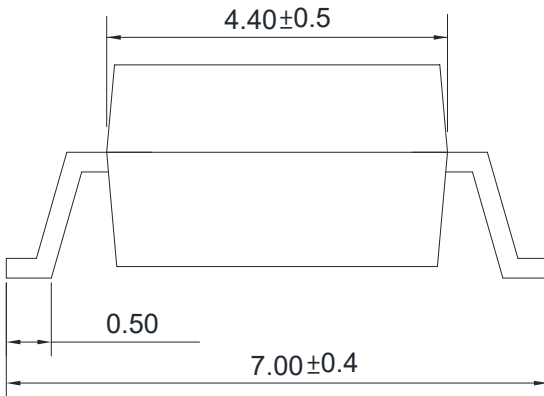
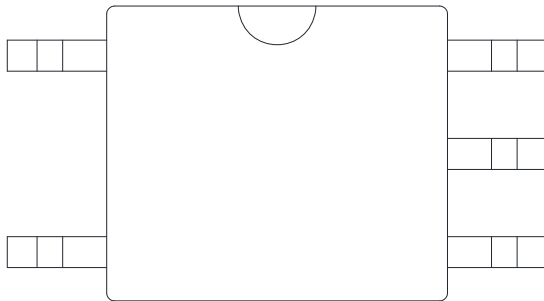
- Pb free and RoHS compliant
- Dual voltage operation (3.3V/5V)
- 10 kV/ $\mu$ s minimum Common Mode Rejection (CMR) at VCM = 1000V (3.3V operating voltage)
- High speed: 10 MBd typical
- LVTTL/LVCMOS compatible
- Low input current capability: 5 mA
- Guaranteed AC and DC performance over temperature:  $-40^{\circ}\text{C}$  to  $+110^{\circ}\text{C}$
- Agency Approvals:
  - UL Approved
  - c-UL Approved
  - VDE Approved

### ● Applications

- Isolated line receiver
- Computer-peripheral interfaces
- Microprocessor system interfaces
- Digital isolation for A/D, D/A conversion
- Switching power supply
- Instrument input/output isolation
- Ground loop elimination
- Pulse transformer replacement
- Field buses

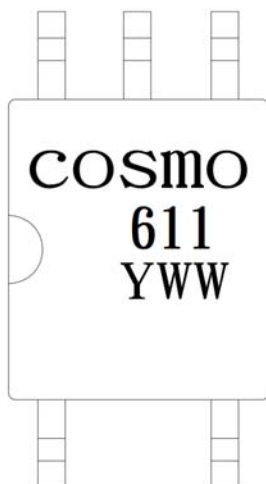
● **Outside Dimension**

Unit : mm



TOLERANCE: ±0.2mm

● **Device Marking**



**Notes:**

cosmo  
611  
YWW

Y: Year code / WW: Week code



# KPC611 Series

## 5PIN HIGH-SPEED OUTPUT PHOTOCOUPLER

### ● Absolute Maximum Ratings

(Ta=25°C)

Parameter		Symbol	Rating	Unit
Input	Forward current	$I_F$	25	mA
	Peak forward current (1)	$I_{FM}$	40	mA
	Reverse voltage	$V_R$	5	V
	Power dissipation	$P_D$	45	mW
Output	Supply voltage	$V_{CC}$	7	V
	High level output voltage	$V_{OIL}$	7	V
	Low level output current	$I_{OL}$	50	mA
	Output collector power dissipation	$P_C$	85	mW
Isolation voltage (2)		Viso	3750	Vrms
Operating temperature		Topr	-40 to +110	°C
Storage temperature		Tstg	-55 to +125	°C
Soldering temperature 10 seconds		Tsol	260	°C

Note 1: Pulse width (PW)  $\leq$  1 ms, duty = 50 %

Note 2: This device is considered as a two-terminal device: Pins 1 and 3 are shorted together, and pins 4, 5 and 6 are shorted together.

### ● Electro-optical Characteristics

Over recommended operating condition ( $T_A = -40^{\circ}\text{C}$  to  $+110^{\circ}\text{C}$ ,  $2.7\text{V} \leq V_{DD} \leq 3.6\text{V}$ ) unless otherwise specified.

All Typical specifications at  $V_{CC} = 3.3\text{V}$ ,  $T_A = 25^{\circ}\text{C}$ .

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input forward voltage	$V_F$	$I_F=10\text{mA}$	-	1.35	1.7	V
Input reverse voltage	$V_{BR}$	$I_R=10\mu\text{A}$	5	-	-	V
Input capacitance	$C_{IN}$	$V_F=0$ , $f=1\text{MHz}$	-	60	-	pF
High Level Output Current	$I_{OH}$	$V_{CC}=3.3\text{V}$ , $V_O=3.3\text{V}$ , $V_F=0.8\text{V}$	-	2	10	$\mu\text{A}$
Low Level Output Voltage	$V_{OL}$	$V_{CC}=3.3\text{V}$ , $I_F=7.5\text{mA}$ , $I_{OL}(\text{Sinking})=13\text{mA}$	-	0.3	0.5	V
High Level Supply Current	$I_{CCH}$	$V_{CC}=3.3\text{V}$ , $I_F=0\text{mA}$	-	3	7	mA
Low Level Supply Current	$I_{CCL}$	$V_{CC}=3.3\text{V}$ , $I_F=10\text{mA}$	-	3	7	mA
Input Threshold Current	$I_{TH}$	$T_A = -40^{\circ}\text{C}$ to $85^{\circ}\text{C}$ $V_{CC} = 3.3\text{V}$ , $V_O = 0.6\text{V}$ , $I_{OL}(\text{Sinking}) = 13\text{mA}$	-	2.5	5	mA
Isolation resistance (input-output) (3)	$R_{I-O}$	$V_{I-O}=500\text{V}$	-	$10^{12}$	-	$\Omega$
Capacitance (input-output) (3)	$C_{I-O}$	$f=1\text{MHz}$	-	0.6	-	pF

Over recommended temperature ( $T_A = -40^{\circ}\text{C}$  to  $+110^{\circ}$ ,  $4.5\text{V} \leq V_{DD} \leq 5.5\text{V}$ ) unless otherwise specified.

All Typical specifications at  $V_{CC} = 5\text{V}$ ,  $T_A = 25^{\circ}\text{C}$ .

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input forward voltage	$V_F$	$I_F=10\text{mA}$	-	1.35	1.7	V
Input reverse voltage	$V_{BR}$	$I_R=10\mu\text{A}$	5	-	-	V
Input capacitance	$C_{IN}$	$V_F=0$ , $f=1\text{MHz}$	-	60	-	pF
High Level Output Current	$I_{OH}$	$V_{CC}=5\text{V}$ , $V_O=5\text{V}$ , $V_F=0.8\text{V}$	-	2	10	$\mu\text{A}$
Low Level Output Voltage	$V_{OL}$	$V_{CC}=5\text{V}$ , $I_F=7.5\text{mA}$ , $I_{OL}(\text{Sinking})=13\text{mA}$	-	0.2	0.4	V
High Level Supply Current	$I_{CCH}$	$V_{CC}=5\text{V}$ , $I_F=0\text{mA}$	-	4	7	mA
Low Level Supply Current	$I_{CCL}$	$V_{CC}=5\text{V}$ , $I_F=10\text{mA}$	-	4	7	mA
Input Threshold Current	$I_{TH}$	$V_{CC} = 5\text{V}$ , $V_O = 0.6\text{V}$ , $I_{OL} > 13\text{mA}$	-	3	5	mA
Isolation resistance (input-output) (3)	$R_{I-O}$	$V_{I-O}=500\text{V}$	-	$10^{12}$	-	$\Omega$
Capacitance (input-output) (3)	$C_{I-O}$	$f=1\text{MHz}$	-	0.6	-	pF

Note 3: This device is considered as a two-terminal device: Pins 1 and 3 are shorted together, and pins 4, 5 and 6 are shorted together

### ● Switching Specifications

Over recommended temperature ( $T_A = -40^{\circ}\text{C}$  to  $+110^{\circ}\text{C}$ ),  $V_{CC} = 3.3\text{V}$ ,  $I_F = 7.5\text{ mA}$  unless otherwise specified.  
All Typical specifications at  $T_A = 25^{\circ}\text{C}$ .

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Propagation delay time to high output level	$t_{PLH}$	$I_F=7.5\text{mA}, V_{CC}=3.3\text{V}, R_L=350\Omega,$ $C_L=15\text{pF}$	-	60	90	ns
Propagation delay time to low output level	$t_{PHL}$		-	45	70	ns
Pulse Width Distortion	$ t_{PHL} - t_{PLH} $		-	-	30	ns
Propagation Delay Skew	$t_{PSK}$		-	-	30	ns
Rise time	$t_r$	$I_F=7.5\text{mA}, V_{CC}=3.3\text{V}, R_L=350\Omega,$ $C_L=15\text{pF}$	-	30	-	ns
Fall time	$t_f$		-	5	-	ns
High level Common Mode Transient Immunity	$CM_H$	$I_F=0\text{mA}, V_{CC}=3.3\text{V}$ $V_{CM}=10\text{V}, V_O(\text{Min})=2.0\text{V}$ $R_L=350\Omega$	10,000	-	-	V/us
Low level Common Mode Transient Immunity	$CM_L$	$I_F=7.5\text{mA}, V_{CC}=3.3\text{V}$ $V_{CM}=10\text{V}, V_O(\text{Max})=0.8\text{V}$ $R_L=350\Omega$	10,000	-	-	V/us

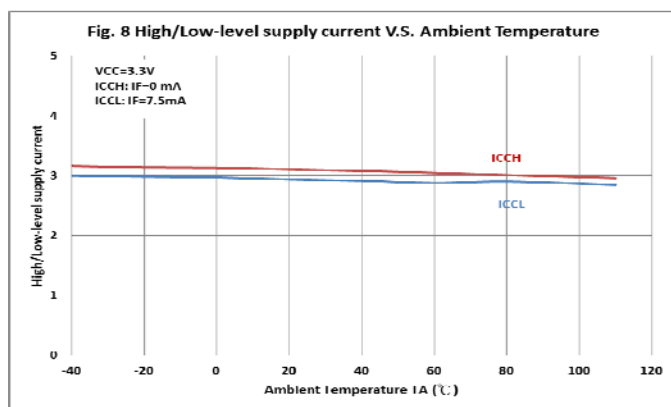
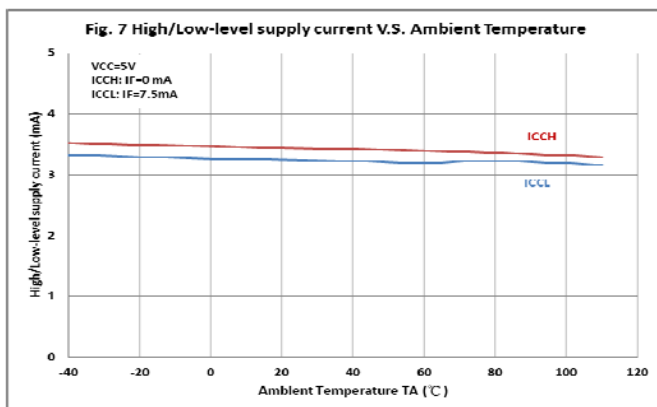
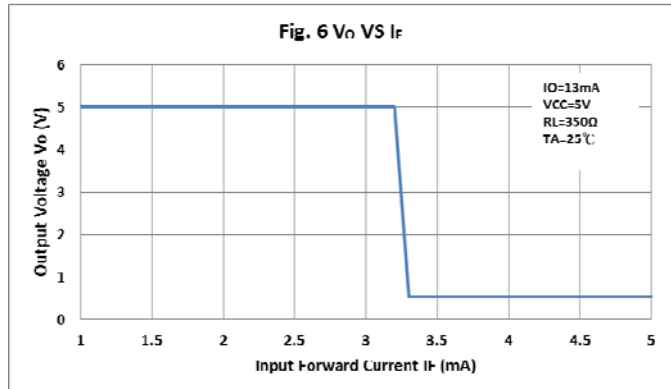
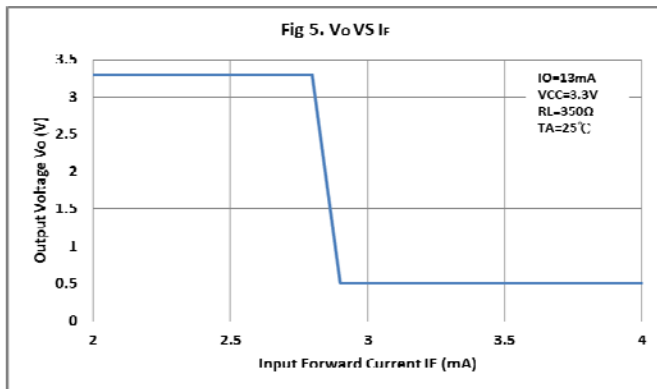
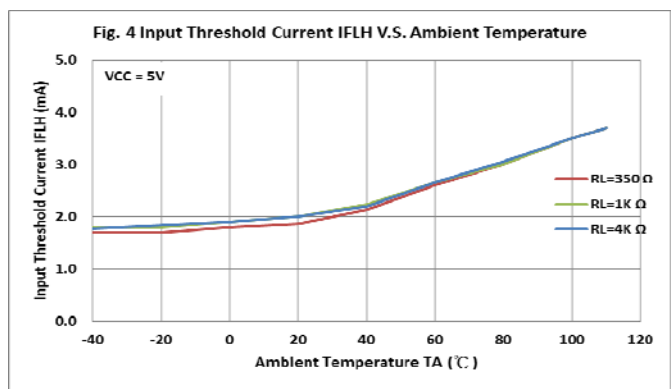
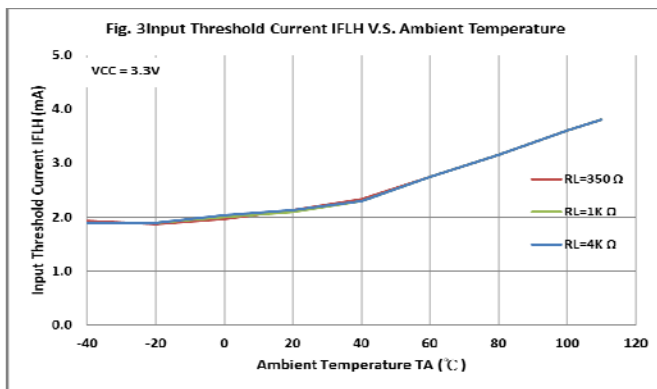
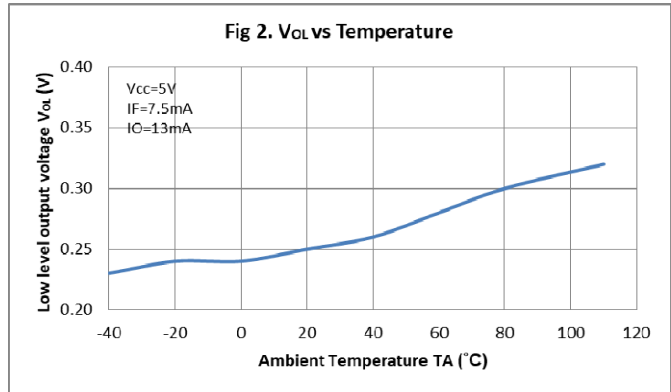
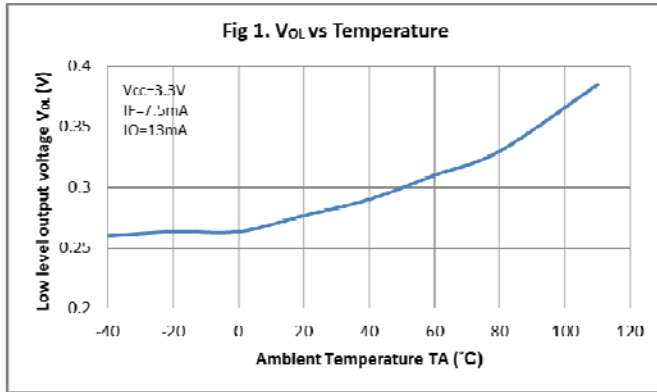
Over recommended temperature ( $T_A = -40^{\circ}\text{C}$  to  $+110^{\circ}\text{C}$ ),  $V_{CC} = 5\text{ V}$ ,  $I_F = 7.5\text{ mA}$  unless otherwise specified.  
All Typical specifications at  $T_A = 25^{\circ}\text{C}$ .

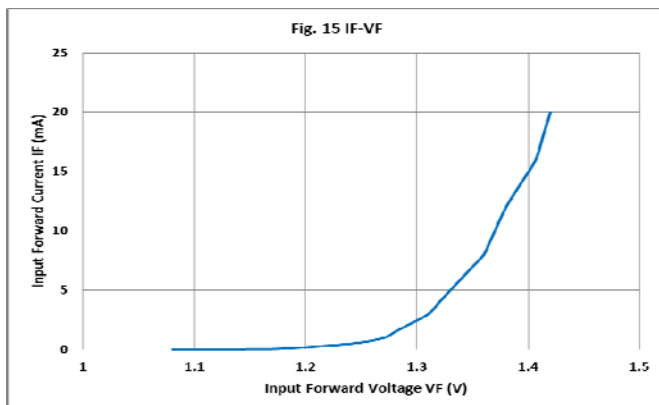
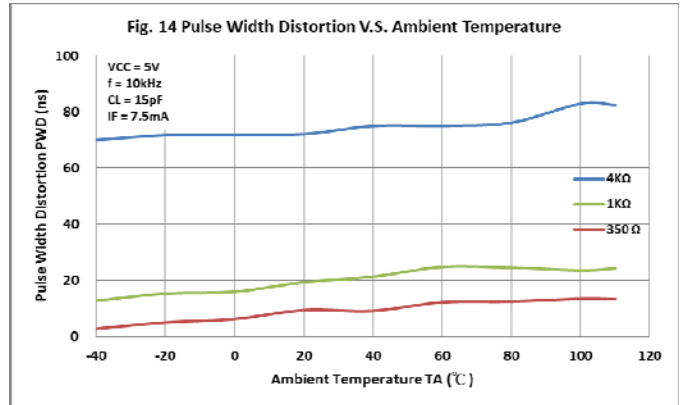
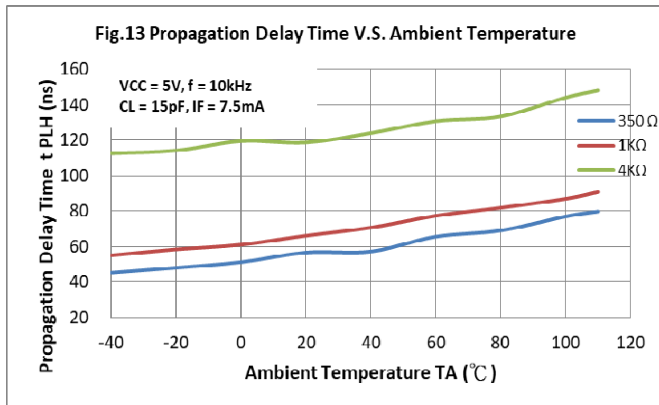
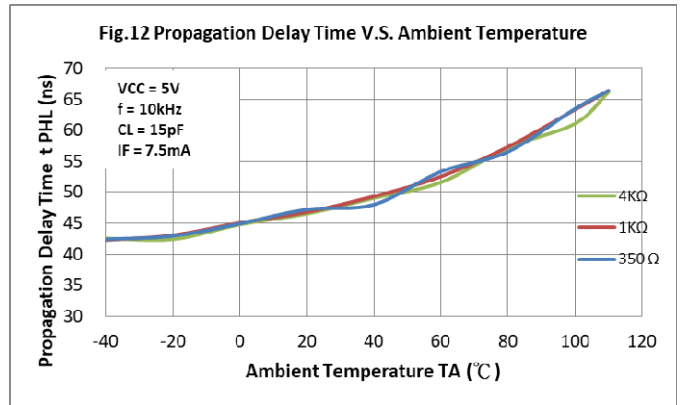
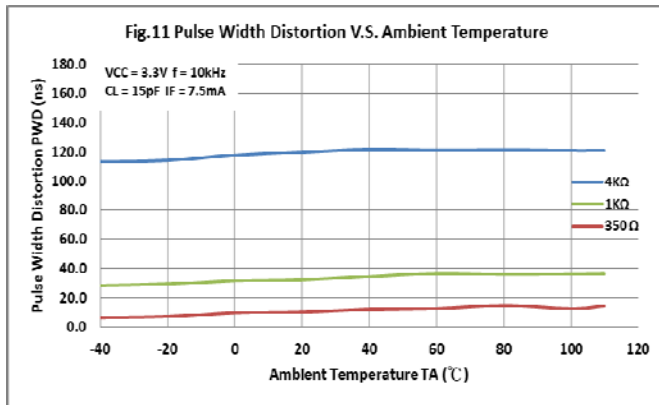
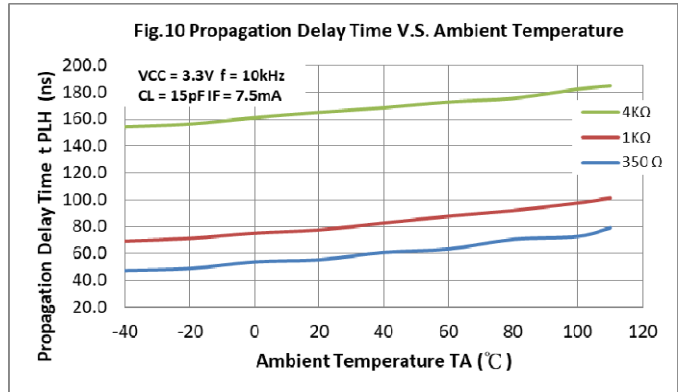
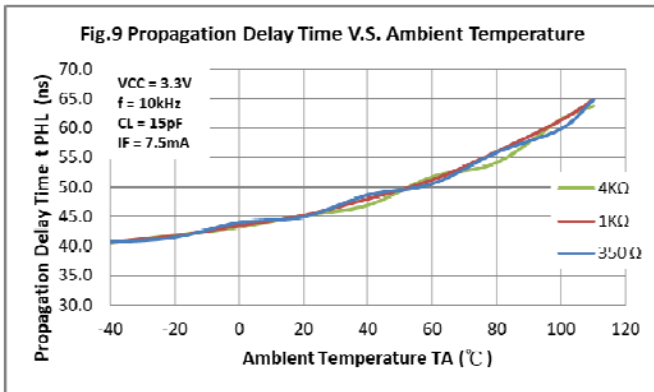
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Propagation delay time to high output level	$t_{PLH}$	$I_F=7.5\text{mA}, V_{CC}=5\text{V}, R_L=350\Omega,$ $C_L=15\text{pF}$	-	60	90	ns
Propagation delay time to low output level	$t_{PHL}$		-	50	70	ns
Pulse Width Distortion	$ t_{PHL} - t_{PLH} $		-	-	30	ns
Propagation Delay Skew	$t_{PSK}$		-	-	30	ns
Rise time	$t_r$	$I_F=7.5\text{mA}, V_{CC}=5\text{V}, R_L=350\Omega,$ $C_L=15\text{pF}$	-	30	-	ns
Fall time	$t_f$		-	5	-	ns
High level Common Mode Transient Immunity	$CM_H$	$I_F=0\text{mA}, V_{CC}=5\text{V}$ $V_{CM}=1000\text{V}, V_O(\text{Min})=2.0\text{V}$ $R_L=350\Omega$	10,000	-	-	V/us
Low level Common Mode Transient Immunity	$CM_L$	$I_F=7.5\text{mA}, V_{CC}=5\text{V}$ $V_{CM}=1000\text{V}, V_O(\text{Max})=0.8\text{V}$ $R_L=350\Omega$	10,000	-	-	V/us

● **Recommended Operating Conditions**

Parameter	Symbol	Min	Max	Unit
Low level input current	I <sub>FL</sub>	0	250	μA
High level input current	I <sub>FH</sub>	6	15	mA
Supply voltage	V <sub>CC</sub>	2.7	3.6	V
		4.5	5.5	
Fan out (TTL load )	N	-	5	-
Operating temperature	T <sub>opr</sub>	-40	+110	°C

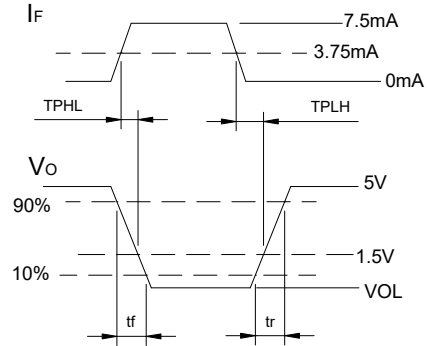
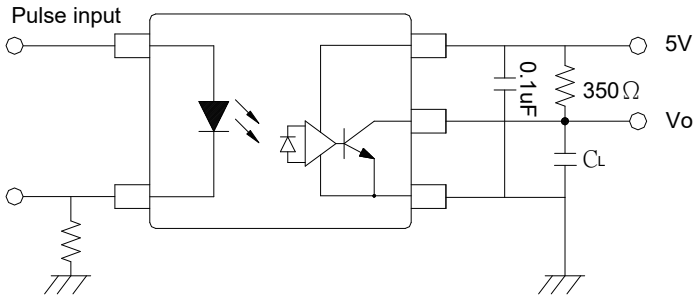
### ● Characteristics Curves



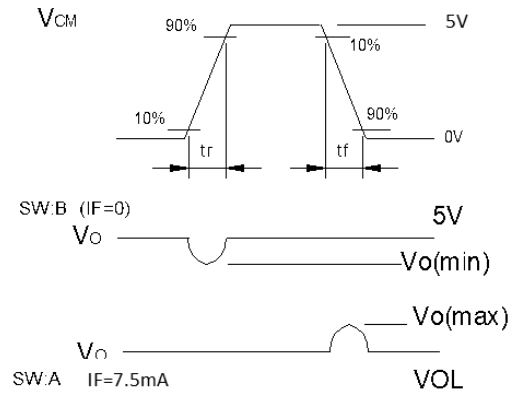
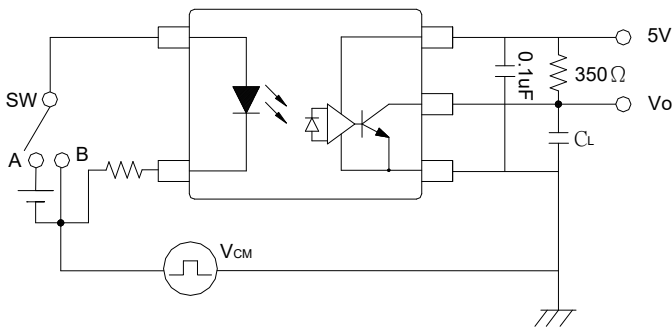




● **Test Circuit for Propagation Delay time**



● **Test Circuit for Instantaneous Common Mode Rejection Voltage**

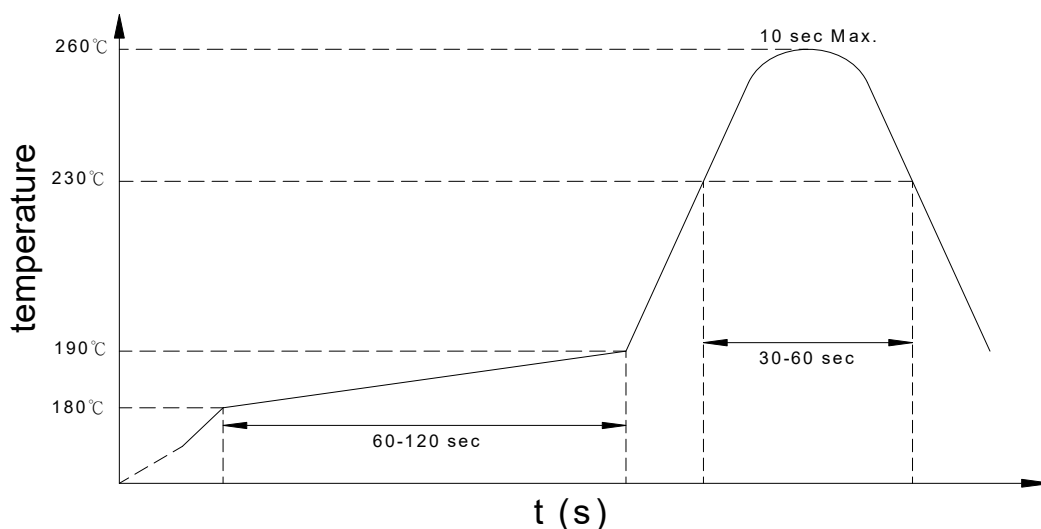


● **Recommended Soldering Conditions**

**(a) Infrared reflow soldering :**

- Peak reflow soldering : 260°C or below (package surface temperature)
- Time of peak reflow temperature : 10 sec
- Time of temperature higher than 230°C : 30-60 sec
- Time to preheat temperature from 180~190°C : 60-120 sec
- Time(s) of reflow : Two
- Flux : Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

**Recommended Temperature Profile of Infrared Reflow**



**(b) Wave soldering :**

- Temperature : 260°C or below (molten solder temperature)
- Time : 10 seconds or less
- Preheating conditions : 120°C or below (package surface temperature)
- Time(s) of reflow : One
- Flux : Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

**(c) Cautions :**

- Fluxes : Avoid removing the residual flux with freon-based and chlorine-based cleaning solvent.
- Avoid shorting between portion of frame and leads.

● **Numbering System**

**KPC611 (Z)**

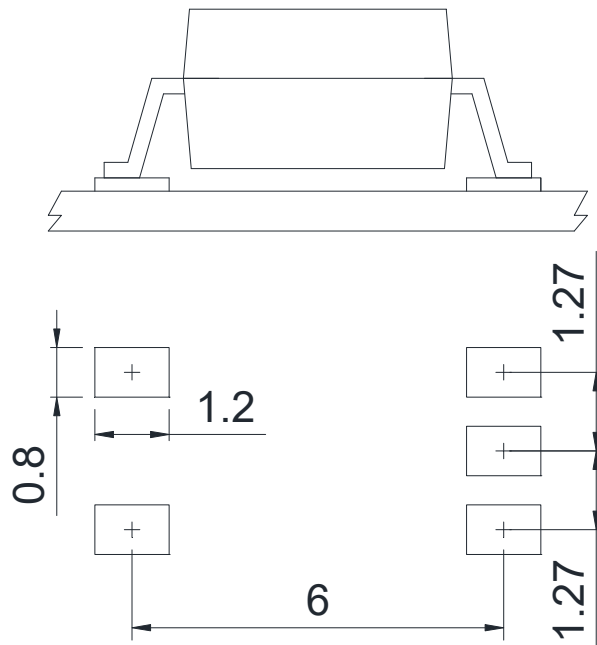
**Notes:**

KPC611 = Part No.

Z = Tape and reel option (TLD, TRU)

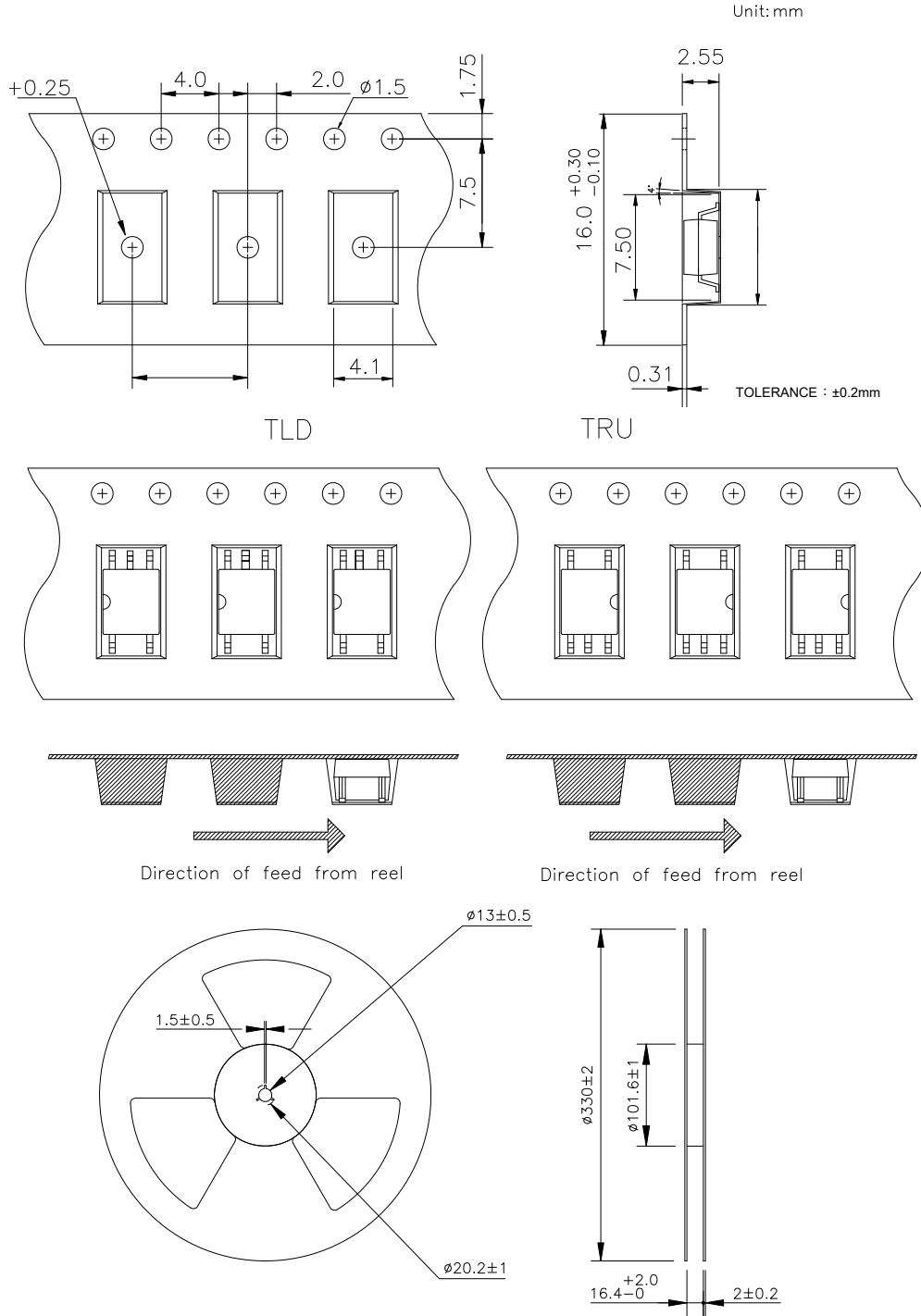
Option	Description	Packing quantity
TLD	TLD tape & reel option	3000 units per reel
TRU	TRU tape & reel option	3000 units per reel

● **Recommended Pad Layout for Surface Mount Lead Form**



Unit : mm

● SOP Carrier Tape & Reel



- **Application Notice**

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